PRACTICAL ADVICE

TO

AMATEUR PHOTOGRAPHERS;

OR, THE

DIRECT NEGATIVE PROCESS,

v.

STRENGTHENING POSITIVES.

BY

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PREFACE.

In submitting this little work to the Photographic world, the author feels considerable diffidence, on account of the many excellent works already existing on the same subject by more eminent authorities; but, inasmuch as he has had considerable experience,—from the old Daguerreotpying days to the present of "cartes de visite,"—in instantaneous and other kinds of photography, both in England and abroad, he feels some little hope that his efforts to contribute his mite to the general stock of information on our beautiful art will be favourably received. Those who may have to operate in a hot climate may possibly benefit by a few words on the subject; while, perhaps, to those who may be hesitating as to the alteration or construction of their Glass Room, a few words on that subject may be acceptable, and save them some little expense. His endeavour has been to explain the why and wherefore in as brief a compass as possible.

In the arrangement of the work, the author has placed at the head of each subject the formula he has found best

adapted for obtaining good results, and has then endeavoured to explain why he has adopted those formulas. Although this work was not written with the intention of giving instruction in the rudiments of Photography,—such being readily obtained by taking a lesson, or by purchasing any elementary work on the subject,—yet, with the exercise of a little patience and judgment, any non-photographic reader may, by its assistance, very readily acquire the art.

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PRACTICAL ADVICE

TO

AMATEUR PHOTOGRAPHERS.

THE POSITIVE PROCESS ON GLASS.

BATH.—Nitrate of silver, thirty grains; distilled water, one ounce. To every sixteen ounces of bath, add half an ounce of iodized positive collodion; shake it well for a short time, and let it stand for an hour; now add, for the same quantity of bath, one drachm of pure nitric acid; and filter.

DEVELOPING SOLUTION.—Protosulphate of iron, fifteen grains; nitric acid, three drops; water, one ounce; and just sufficient alcohol to make it flow.

FIXING SOLUTION.—Cyanide of potassium.

CLEANING THE GLASS.—This, although a simple operation, is in reality of the utmost importance. The writer has tried nearly every method, but finds nothing so simple and certain as the following; first premising, however, that no matter how well a picture may be timed or developed,

or however well the bath and chemicals are working, to have a good picture on a dirty glass, is an impossibility.

In a small-lipped jug make a mixture of three parts, by measure, of strong sulphuric acid and about the same quantity of water, by pouring the acid cautiously and gradually to the water. Now take a strong glass rod, and round one end wrap a piece of white linen or calico. With the mixture and brush thus made, paint over as many glasses as you wish to use (great caution should be taken that the acid does not splash on your face or clothes), then rinse them well under a tap of clean water, and stand them on a piece of clean blotting-paper to drain; when drained, take a clean linen glass-cloth, and wipe them all dry.

To ensure a cloth sufficiently clean which has been washed in the usual way, soak it for a few minutes in about half a gallon of water, to which has been added about four drachms, by measure, of strong sulphuric acid. This will neutralize any alkali from the soap or soda, which is extremely difficult to get out of the cloth by any other means. Having done this, rinse it well in four or five waters (clean), because if any acid is left in the cloth when it is dry, it will make it rotten. Just previous to using a glass, it should be polished with a clean chamois leather washed in precisely the same manner as the cloth.

Having thus obtained a clean glass, the operator will be amply repaid for the trouble—which, after all, is very little, as the whole operation takes up less time to perform than it does to describe—in the good result which will follow.

Coating the Glass.—Take a clean (patent plate) glass by one corner, and brush over the surface with a clean broad, flat camel-hair brush, to remove any particles of dust

adhering to the glass. Holding the glass in the most convenient manner to yourself, from a small bottle previously well settled and decanted from another bottle (presently to be described) pour sufficient positive collodion (iodized) to cover it, and drain it off one corner back into another empty bottle; this bottle should be large enough to hold the drainings of several glasses, which when full should be allowed to stand aside a day or two to settle, before it is fit to use again. This method will be found useful to prevent any dust which may settle on the collodion during the coating being poured on the next glass. After allowing the collodion to set a little, immerse it in a bath composed as above. The proper time of immersion, &c., is governed to a certain extent by similar conditions as are found to apply in the case of negatives described hereafter. Take the dipper in the left hand, and with the right lay hold of the glass by the edges or one corner, laying the edges for a second or two on a thick piece of clean white blotting-paper, to allow the excess of nitrate of silver to drain on it; then place it in the dark frame of the camera, with the prepared surface resting on the silver wires at the corner.

The exposure in the camera depends, of course, so much on the light, the subject, the kind and quality of lens, &c., that any attempt to name the proper time would be useless. If the picture has been too long exposed, it will present a confused faint greyish-white image, with very little difference between the high lights and deep shadows. If the exposure has been too short, only the high lights and deep shadows will be seen. This will be found the best guide.

The sensitiveness of the positive film will be found to depend a great deal on the quantity of nitric acid in the bath, as well as the quality of collodion. Contrary to the

expectation of many, the presence of a considerable quantity of *nitric acid* in a positive bath is necessary to give it sensitiveness, as well as to prevent stains, &c., &c., and to give brightness and vigour to the image. We would not, however, advise a greater quantity than that given in the above formula, as more than that will be found to make the film very rotten and tender, and prevent the pure pearly tone so desirable in positives. In this process, contrary to our experience in the negative, we have found the presence of a bromide in the collodion indispensable to sensitiveness and half-tone. In the negative process, on the contrary, it is positively mischievous, as the small portion of bromide which is absorbed by the bath is sufficient in many cases to spoil it, and prevent density in the negative; besides which, there is no gain in the sensitiveness of a negative film by the presence of a bromide. It is only where we have a large excess of free nitric acid, as in the positive bath, that we gain any advantage in using a bromized collodion, where we undoubtedly find it extremely serviceable.

Having exposed the glass in the camera, and closed the slide, we now proceed to develope the picture in a room illuminated only by a yellow light. It is of no consequence how much light we have—the more the better, whether of day-light or gas-light—provided it passes through three or four thicknesses of good yellow calico or paper. The light should be so arranged that, when developing, a portion of it should pass from below the glass and through it to the eye of the operator, so that he may judge not only the amount of surface deposit, but also the *thickness* of it; because, if too thick, the positive will not have good half-tones, however desirable it may be to have a thick deposit for the blackened positive process for negatives, to be described

hereafter. When the deposit is seen to be too thick, and the half-tone consequently not good, it is a sign that the bath wants a little more nitric acid, which should be added a drop or two at a time, until the desired attenuation of deposit is obtained.

In pouring on the developing solution, it should be smartly jerked along the edge, and, with a twist of the wrist, made to flow all over the glass at once; because, if poured on one spot, it will be found to leave a black stain, which is very awkward, especially in the case of a light object, such as a lady's light dress, for instance.

If a bath and developing solutions are made up explicitly to the above formula, it is impossible to fail in taking a good positive, as really the only thing to be looked to is to give the right exposure in the camera, which a very little practice will soon give.

Washing and Fixing.—Having developed the image to our satisfaction, we will now wash it well with a plentiful supply of water from a tap or jug. In the case of a tap, it will be found useful to tie a rag over it, to keep back small particles of dirt (a rough kind of filter, in fact), to prevent the film being knocked into small holes by their falling on its surface. Extreme caution should be taken, by well washing, to get rid of all traces of developing solution, especially iron, to prevent stains when the cyanide solution is poured on. A lump of cyanide of potassium, the size of a hazel nut, to half a pint of water, makes a very good fixing solution for both positives and negatives: it is most conveniently kept in a small-lipped jug, which should never, of course, be used for any other purpose, as cyanide of potassium is a deadly poison. This solution should be poured on the film

and back into the jug again, and may be used many times over. The picture should now be well washed with clean water under the tap, to get rid of all traces of cyanide of potassium (which, if left on, would destroy the image), and then stood with its face to the wall, to drain, on a piece of clean blotting-paper; after which it should be dried before a fire or otherwise, and varnished. The back of the glass should be blackened, either with black varnish, or the same effect may be produced by fixing behind it a piece of good black velvet.

Turning Positives into Negatives.—As in practice the above process is found the most simple to work and the easiest to acquire, for the information of those who would rather convert their positives into negatives than take negatives direct, we will give a few plain directions whereby they may do so.

If we wish to obtain a negative, we must use a bromo-iodized collodion of *superior quality*, because a collodion made of common materials, although answering perfectly well for positives, will not stand the repeated washings and blackenings necessary to get the desired density. Even if it adheres to the glass, it will, on drying, be found to be full of crape-like markings, which will print along with the picture.

The manipulation is the same as taking a positive, only the exposure should be twice the length of time in the camera, and the developer should be made stronger—say, thirty or forty grains of protosulphate of iron to an ounce of water, controlled by from twenty to thirty minims of acetic acid, without any nitric acid or alcohol as in the positive developer. It would be as well, too, to have as

little nitric acid as possible in the bath: just sufficient to make it develope sensitive and clean, as too much would impair its power of giving the density required in the after-process, and also act on the tenacity of the film.

After keeping the iron developer on the film until the detail is well out, rinse the glass well under a tap of clean water, to get rid of the iron solution; then, while wet, pour on and off the glass a mixture of pyrogallic acid and nitrate of silver solutions until the image is sufficiently dense to print; then wash it well again with water, and fix with cyanide of potassium; wash and dry in the usual manner.

A little old positive bath kept in a small bottle is a very convenient way of having at hand the silver used for blackening, while the pyrogallic acid solution should be rather strong—say, ten grains to the ounce of water, controlled by a little *citric acid*—say, a lump the size of a horse-bean to half a pint of solution. If nitric or acetic acid is used to control the deposit, or rather to prevent spontaneous deposition of the silver, it will be found to have a tendency to make the film tender; besides, in the case of acetic acid, it would be found that, on attempting to wash after redeveloping, the water would for some time refuse to amalgamate, on account of the apparent greasiness which it communicates to the film; and our object is to reduce the length of the washings as much as possible. The quantity of citric acid mentioned will be found to be ample for the purpose, and it has an advantage in influencing the colour of the deposit favourably to printing.

Another method to convert positives into negatives,—but we have not found it so manageable as the preceding,—is, to take a *faint* positive, but with the detail well out; to fix,

wash, and dry it; then pour over it in the dark room a strong solution of iodine, either in alcohol or in a solution of iodide of potassium. After the deposit of silver composing the picture has by this means (or by any other which will form an iodide) been fully acted on, wash off the iodine with plenty of water, finishing with a few drops of silver in a little distilled water; then hold it for a few seconds (to be determined by practice) to the full light of a fish-tail gas burner; then redevelope with the before-mentioned mixture of pyrogallic acid and silver; wash and dry.

Another method is, to take a strong positive, and, after it has been fixed and well washed, to pour over it a solution of bi-chloride of mercury, either in alcohol or dilute hydrochloric acid. After the film has been properly acted on to the satisfaction of the operator, wash off all traces of bi-chloride of mercury with water; then pour on a very weak solution of hyposulphite of soda, which will turn the deposit into an intense black; well wash and dry. This process is a very good one to tone or colour the positives on glass printed from dry plates.

THE NEGATIVE PROCESS ON GLASS.

BATH.—To make a bath, say, of fifteen (fluid) ounces, dissolve in a clean twenty-ounce stoppered bottle one ounce of pure nitrate of silver in three ounces of distilled water; now in another bottle or measure make the following solution. Weigh out twelve grains of pure acetate of soda and six grains of iodide of potassium; dissolve them together in six ounces of distilled water; add an ounce of this solution to the three ounces of silver solution; shake it; then pour distilled water to the concentrated bath thus made, until it is diluted to fourteen ounces; let it stand a few hours, occasionally shaking it; then filter. Try a picture; if it developes too foggy, add a drachm at a time,—occasionally trying a picture,—of a solution of one drop of pure nitric acid to an ounce of distilled water, until the picture developes satisfactorily.

DEVELOPING SOLUTION.—Protosulphate of iron, ten grains; glacial acetic acid, thirty minims; water, one ounce. Dissolve thoroughly; then add one drop strongest liquor ammonia, or pyrogallic acid, two grains; acetic acid, thirty minims; water, one ounce.

FIXING SOLUTION.—Cyanide of potassium or hyposulphite of soda.

This is the most beautiful, yet, at the same time, the most delicate and difficult process we shall have to describe; but we strongly recommend our reader to persevere until

he masters it, because it gives better results, and is infinitely more manageable than many of the so-called negative processes, one or two of the best of which we described in the positive process. It is essential, however, that we secure a good iodized collodion, as bromo-iodized and other collodions are a delusion and snare in this process. (See "Appendix.") It should flow freely, and drain off the glass without showing any reticulation.

After coating the glass with iodized collodion, allow it to set a little before immersion in the bath, and on no account touch any part of the back of the glass with your fingers, except at the edges, as the warmth evaporates the ether off more rapidly there, and leaves a corresponding stain when developed. A little practice will give the right time which should elapse between the coating and immersion in the bath, as so much depends on the temperature, the quality of collodion, &c. If the glass has been kept too long, it will be found on developing to have transparent stains round the edges, owing to the solvents of the iodide having evaporated there most readily. On the other hand, if immersed too soon, the collodion will be precipitated in cellular-looking marks, or a coarse network of streaks. The length of time the collodionized glass should remain in the bath is a very important matter. In this case, as the other, there is no rule can be laid down as to time; but the results are sufficiently obvious to very easily fix themselves on one's memory. If taken out too soon, the film will appear of a bluish hue, and the iodide of silver very thin and poor, and not sensitive; the picture will also develope very hard, that is, the high lights and deep shadows only will appear, and will print very black and white without half-tone. If the glass is kept too long in the bath, then the film has a

greyish-white appearance on removal from the bath; has a great tendency to fog under the developer; and gives a flat, faint impression, with scarcely any high lights or deep shadow. The right time lies between these points, according to the quality of picture wanted. For a landscape, for instance, the immersion should be shorter than for a portrait. These remarks are, of course, supposed to apply to a picture properly timed in the camera, with the chemicals in good working order, as there are many other conditions which will give similar appearances, but which, although resembling the effect described, yet are sufficiently distinct, after a little practice, to be easily distinguished.

Best Chemical Condition of Bath.—We have found that for a negative bath to give a film sufficiently sensitive, yet at the same time to develope dense enough for printing at once, and without re-developing or strengthening, or whatever it may be termed, a small quantity of *alkali*—masked, however, by a slight excess of some organic acid—is indispensable. To prove this position, let us examine the results we get from the formulæ for bath and developing solutions which most beginners in photography are taught to use. Let us take the favourite one, which seems to be, pure nitrate of silver and distilled water, with a little iodide of some kind added to it (to prevent the silver eating away the iodide from the film of collodion), and perhaps a little alcohol or ether, or, may be, an infinitesimal dose of acetic or nitric acid. Practically, what is the result? Why, on developing the picture taken with an iodized collodion (which, we repeat, is best for negatives) and a neutral, or simple silver and water bath, it will be found that the picture appears struggling to get through a cloud of all

sorts of photographic difficulties, in the shape of fog, veils, haze, streaks, comets, &c., &c., and the picture appears under-exposed. The remedy for this, say some, is a little acid—well, let us try—say, nitric. We try another glass, and what do we get? If sufficient is added to clear away the previous difficulties, we get another; for if developed with pyrogallic acid, the picture is certainly free from the previous defects, but the picture vanishes with them, and we only get the extreme high lights, and those so faint as to be totally useless for printing. With the iron developer the matter is very little better, besides the greater length of exposure necessary in the camera.

Suppose we had tried a little acetic acid instead, we should find the bath deteriorated in sensitiveness, without getting rid of our enemies.

Let us now try the system advised by the writer, starting with a neutral, or plain silver and water bath.

To a fifteen-ounce bath, of the strength of thirty-five grains to the ounce, let us add one or two grains of an alkali dissolved in a little distilled water; after well shaking this with the bath for a minute or two, the bath should be well filtered. After preparing a glass, and giving it the right exposure in the camera, what do we now find on developing? Positively nothing at all apparently. The film blackens instantaneously under the developer, and there is no picture to be seen, but we *do* see the character of the deposit is totally changed: instead of the previous greyish-leaden hue of the surface, we have, after the picture has been fixed and washed, a deposit of a brownish orange colour, and when held up to the light and looked through, the film appears of a brownish yellow, inclining in some places to a purple. The bath now evidently requires a little

acid of some kind to prevent the spontaneous blackening of the film; but as the alkali was added to the bath to remove all traces of free nitric acid, it is evident that nitric acid cannot be used, or any other which would liberate it. We have tried various acids, but find none equal to acetic, which, for reasons too numerous to be mentioned here, we recommend as being the best. Acetic must be added very sparingly to the bath, just barely sufficient to mask the alkali and to develope clearly. Two or three drops are more than sufficient to neutralize the small portion of oxide of silver formed from the alkali.

As the strength of acetic acid is very subject to variation in different samples, and as it is not always possible or convenient to get pure caustic potash, soda, or other alkalies, it will be found much more certain if we take an acetate of any alkali, say acetate of soda (as the most conveniently obtained), because here acid and alkali are combined in equivalent proportions. To a fifteen-ounce bath add two or three grains of this salt, dissolved in half an ounce of distilled water; this will combine with the nitrate of silver when added to the bath, forming acetate of silver, which readily dissolves therein to the extent of nearly twenty grains to a pint. For this reason more than the two or three grains recommended may be added without injury, only that the proportion of acid which is to be added in addition will have to be increased in the same ratio, and will be found less manageable.

Supposing, then, we have added to a fifteen-ounce bath two grains of acetate of soda, we shall find, on developing a picture, the same spontaneous blackening of the film, provided there was no free nitric acid in the crystals of silver of which the bath was composed, as it very often happens

there is a trace. Should there have been any free nitric acid in the crystals, it will perhaps be found not necessary to add any more acid, as the nitric acid may have liberated sufficient acetic acid from the acetate of silver by forming nitrate of the oxide of silver, and setting acetic acid free. Should, however, this not be the case, make a solution of a drop of *pure* nitric acid in an ounce of distilled water; "add a drachm or two to the bath, occasionally trying a picture, until it developes satisfactorily."

It may be thought a paradox to add nitric acid, when we are trying to secure ourselves against the presence of this very acid; but it will be found that, although we could not use it to neutralize oxide of silver formed by the addition of alkali to the bath (as it would have been only bringing it back to its previous condition of a neutral nitrate), yet in the case of the presence of an acetate the effect is quite altered, as was shown by the description of the action of free nitric acid sometimes found in the bath, due to its being introduced in the crystals of some samples of silver.

No matter, however, how or by what method we introduce the acetate—whether by an alkali to be masked by acetic acid, or by the addition of an acetate (which is the mode we recommend), with a portion of its acid set free by the cautious introduction of a minute quantity of nitric acid—the change in the picture is marvellously satisfactory; for now, instead of a picture flat, and too faint for printing, we get an intensity which may be carried to opacity if desired, without any "redeveloping," "converting," "blackening," &c., &c., with all their attendant risks, uncertainties, and vexations. The change in the colour of the negative is just as extraordinary—the surface appears, when viewed by reflected light, to show objects in almost their natural

colours; indeed, in the case of a landscape, we have often seen them have the effect of views when seen at sunset. This, although so far satisfactory, makes no difference as to its printing qualities, only that when we get negatives with this coloured surface we may be sure the bath is in good working order.

Having thus got over our most likely difficulty, the bath, we will say a few words about the developer.

In the case of a landscape, or copying from flat surfaces such as pictures, &c., we recommend pyrogallic acid for a developer, not too strong or too weak—say, two grains to an ounce of water, controlled by from twenty to thirty minims of pure acetic acid, according to circumstances or the colour of the deposit we wish to obtain.

For portraits, by all means use iron and ammonia, controlled by acetic acid, in the proportions given in the formula. Thus, if we find the bath gives too dense a negative, reduce the proportion of ammonia; if too faint, increase it. By these means we have always the density of the negative under complete control, without altering or in any way meddling with the bath, because it will be found the iron will develope more or less dense in proportion to its greater or less quantity of ammonia, quite independent of the greater or less amount of development we give a picture. When the high lights are of a certain strength, we find they stop at that, while a prolonged development brings out all the details. Take the case of an individual dressed in dark clothes. If we develope with pyrogallic acid before the dress is properly out, we get the face much too dense, unless we very much over-expose the picture in the camera, which is for many reasons undesirable. We

are supposing the case of the bath being in the condition to give dense negatives, which it ought always to be.

We do not by any means wish to infer that good half-tones in a portrait are not to be obtained with pyrogallic acid as a developer; but it is so extremely difficult to keep a bath in the condition to give a negative portrait with good half-tones with a pyrogallic acid developer, without its rapidly verging into a condition to give faint and flat negatives, that we recommend having the bath as described in the formula, so that it can be used for all negative purposes. We can then always *lower* the intensity of a portrait by the reduction of the quantity of ammonia in the developer.

If a greater quantity than one minim of ammonia to the ounce of developer is necessary, it shows that the bath does not contain sufficient acetate of silver; and a trifle more acetate of soda should be added until the negatives are found to develope dense enough, when, with a good collodion, the bath will probably never require any further attention.

The temperature of the bath, developing solutions, collodion, &c., should not exceed 75° Fahr., or be lower than 60° when it is possible to keep it within that range. With regard to photographing in tropical climates, we shall presently have a word or two to say.

We will conclude our remarks on the negative collodion process by pointing out a few of its advantages.

In the first place, it is quite as sensitive, *where the chemicals are properly balanced*, in the manner which we hope we have sufficiently explained, as the most sensitive positive process can be, although many operators, in their despair at

the difficulties attending the negative process, have abandoned it in favour of blackened positives. If there are any such among our readers, we advise them by all means to make another attempt; for although we may blacken a positive portrait to give a tolerably good printing negative, still it will be found that to do so it is necessary to very much over-expose it in order to give sufficient detail; so that, after all, it does not matter, as regards sensitiveness, whether we give sufficient exposure to a positive to "blacken" or "redevelope" or "convert," or give the same time to a negative, and develope in a few seconds what often takes a quarter of an hour the other way. Besides, there is great uncertainty about the results.

If we wish to convert a positive into a negative (for we do not recognise as a negative proper anything which does not develope of sufficient strength at one operation, and with the same developer), there must, after all, be a tolerable positive to start with as a foundation, which is very difficult in some conditions of the positive bath. Even with this advantage, it very often happens that before the film has been sufficiently blackened to print from, it becomes so tender as to wash off the glass altogether. If we succeed we shall find, on drying the negative thus made, that the film has a very roughened surface, which when we varnish it dries of a dull surface, very liable to be scratched on the slightest touch; it will also be found that any particles of dust which may settle during the varnishing will form the nucleus of spots and comets on the surface of a picture otherwise free from those inflictions.

We have always found that, under the most favourable circumstances, negatives thus produced are as a rule deficient

in vigour, the prints from them not having that richness of tone we get from a negative proper; while in the case of landscapes, &c., where great vigour is required, the contras is still greater.

In all the before-mentioned processes we have not attempted to describe any of the apparatus to be used, such being so generally known as not to need any description. The best way, should any of our readers require *good* apparatus (for many of the cheap articles sold as such are worse than useless), is to go to some respectable maker, and select for yourself what common sense will show to be necessary. We can conscientiously recommend the publisher of this work, Mr. How, of 2, Foster Lane, Cheapside, London, who has had very long and extensive experience in the manufacture and selection of apparatus, especially for India.

However, in any case avoid cheap apparatus and chemicals, as they prove in the end much the dearest, leading to no end of expense, of disappointment, and vexation. You will no sooner have got over one difficulty, than you will have another to encounter. Perhaps bad nitrate of silver; another time bad acid; or some other chemicals which you may have found defective and remedied, next time you have a fresh supply, will be found totally altered. Your camera slide will perhaps let in the light, or not coincide with the ground glass, or stick in the grove, requiring great force to remove it, which would infallibly splash the picture. In fact, the only way to avoid these and a thousand other petty vexations, is to be sure of good materials, or, we will venture to say, you never can succeed.

PRINTING.

Having obtained a negative by any of the previously-mentioned processes, our next object is to get a good impression on paper.

Printing Bath.—Nitrate of silver, sixty grains; water (distilled), one ounce.

Into a pint of bath thus made, drop twenty minims of pure liquid ammonia, then filter.

Take a sheet of albumenized or salted paper (the albumenized is preferable for many subjects, as it gives much greater brilliancy of colour); take it by two opposite corners; dip one corner, prepared side down, to the silver solution, which has been previously poured into a flat glass or porcelain dish a little larger than the paper to be sensitized; then gradually lower the paper until the whole surface floats on the solution, taking care to chase all the air before the paper, as any air-bubbles left under the paper would cause large white spots when printed. After floating for about thirty seconds, take it out gradually, with the same precautions and in the same manner, and pin it up to dry in a dark place; when dry, lay its prepared surface against the varnished film of the negative, and place it in the printing frame in such a position that the light must shine through the negative before it can get to the paper.

It is as well to pack the paper at the back with a layer or two of clean blotting-paper, to keep it up to the negative,

as if not kept well up to it, the picture will have a "woolly" appearance when printed.

The impression should be allowed to overprint, until we appear to be losing the high lights; it should be then removed from the frame, and well washed in several waters until the water shows no sign of "milkiness;" it may be then pinned up to dry, if not convenient to tone just then.

We have toned prints kept three months treated in this manner, and with quite as good results as when toned directly after printing.

Toning.—The bath for this should be made very carefully, and with distilled water, as the slightest impurity in water would compromise the tone of the pictures.

Dissolve twelve grains of bi-carbonate of soda in a pint of distilled water, to this add five drachms of a chloride of gold solution (containing about sixty grains of pure gold* to a pint of distilled water), shake the pint of soda water and five drachms of gold solution well together. This quantity will tone a great many prints.

This is a very simple and certain process, the only secret, is to *keep the solution three or four hours after mixing before use*, if it is used at once, it will attack indiscriminately lights and shades, and the picture will have a mealy or speckled appearance.

If kept too long, the gold is precipitated by the soda.

No artificial heat is necessary unless the temperature is less than 50° Fahr.

The prints should be kept well turned over in this solution, and when of the desired colour, they should be removed to another dish of water, well washed in a few fresh waters,

* Or 180 grains of chloride of gold.

then "fixed" in a solution of hyposulphite of soda, the strength of which should be about four or five ounces of the salt to a pint of water.

It is an advantage not to use the fixing solution recently made, as it destroys the colour previously obtained in the gold solution. The best way is, having made a certain quantity for use, when it gets a little low, keep filling up with a little fresh water and hyposulphite, so that there shall not be too much raw hypo at one time.

The prints should be allowed to remain in the fixing solution long enough to dissolve all the chloride of silver, (say twenty minutes), or, when washed and dried, the pictures will be found of a dirty yellow colour, full of scales.

It is indispensable that all the above tonings, washings, &c., should be carried on in a comparatively dark place. It is necessary to have a little white light for toning, to see the proper colour of the prints (daylight is best), but it must be subdued, or the prints will blacken. Of course after fixing, these precautions are not necessary.

There are many other processes for toning, but we give this as one which may always be relied upon, if the proportions are accurately observed; and which is second to none in its results.

PHOTOGRAPHY IN TROPICAL CLIMATES.

The difficulties in operating in a hot climate, after once getting on the right track, are not so great as some imagine. We were overwhelmed with difficulties, when we first attempted photography in India. In spite of everything we could try, likely and unlikely, the film would fog on developing. The only remedy we could find answer for a long time, was to add considerable quantities of acid to the bath. This certainly got rid of fogging, but the length of exposure was enormously increased. At last it struck us that it was not so much the heat (as we have experimented in an artificially raised temperature), *as the energy and rapidity of chemical action* which goes on in the tropics, consequently if we reduced the number of particles to be acted on, or separated them further from each other, that we should thus neutralize their violent action. The thing was tried and found to answer very satisfactorily, the bath was reduced from thirty grains down to eight or ten grains to the ounce. This to many operators in England may seem incredible, they well knowing what effect such a course of procedure would have on the film here; but even then it was found necessary to allow but a very short time for immersion in the bath.

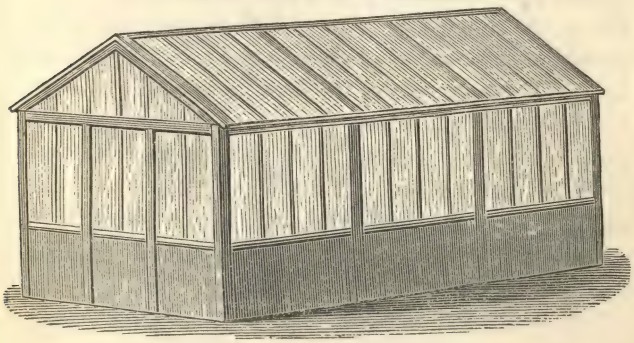
The strength of developing solutions was not of so much consequence, but even they were reduced with advantage.

Another difficulty to be encountered is the rapid drying of the surface of the film, giving use to fern-leaf markings. We tried, as we had found serviceable here, a pad of wet

blotting paper at the back of the glass, but this was of no use. It then occurred to us, from the dryness of the shutter immediately in front of the glass, that it would possibly have a good effect to reverse the conditions. We then scraped the varnish or French polish off the inner side of the shutter, and kept it well moistened with water. This completely remedied that nuisance.

The dark room should be made in the coolest possible place *near* the glass room, not in it. The glass room should be situated in the shade of a tall house, if possible, to avoid every ray of sunshine. The sashes should be made moveable, so as to allow a good current of air. At certain times of the year, the sun is vertical at twelve o'clock; but the glass room can be so arranged as to be shaded without cutting off any of the effective working light. The only object in having a glass covering at all, is to screen off dust, wind, &c. A great portion of the year there is no rain worth speaking of, and when there is no wind, the sashes may be removed altogether.

One of the most general errors with regard to the construction of glass operating rooms, is that the more glass

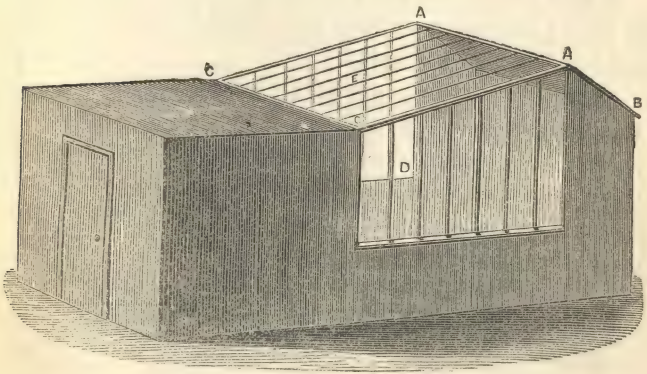


there is, the quicker will the picture be taken; nearly all glass houses are built of the preceding shape, which we will presently show to be a bad one, both for effect and shortness of exposure.

Light passes through a plane of glass with most chemical effect, when the line of its direction is at right angles to its surface. Such being the case, it is evident that a sitter placed at either end of a glass room constructed as above, can receive no direct light at all (as the light over his head *must* be stopped out, or it will give a person whose hair is black, the appearance of having grey hair); all the light which comes to him must have been deflected from its original course, thereby losing a great deal of its chemical properties, besides which it will be found that, however far apart the sash bars are placed (consistent with the necessary strength), they will be found to intercept an immense portion of the light—not from the room, but from the sitter. There it is we want the light, the darker the rest of the room, the better for effect and comfort to the sitter. As the angle of the incidence and reflection of light are known to be the same, it follows as a natural consequence, that where a ray of light from the sky to the sitter, has to pass through the glass at such an acute angle, a great portion of it never passes through at all, but is reflected off again. This may be very familiarly illustrated by observing the blaze of light which may be often observed coming from a cottage window (which may be seen for miles), when the sun is shining. This is light which has impinged on the window at too acute an angle to pass through it; for we must recollect that glass, though transparent, has a highly polished surface.

We have found the following shape of glass room, al-

though not so complete-looking on its exterior as the preceding, a very great improvement both in its convenience and effectiveness. The tallest end for the background, B, is square—a great advantage in taking groups—while all the rest of the room not actually wanted for light may be built of any opaque material, to keep out the heat. The quantity of glass surface need bear very little proportion to the size of the room, as ten feet of glass from the sitter (or from A to C) is sufficient, no matter how long the room may be. If the room is sufficiently wide, there need be no side-lights at all. About three or four feet from the background of the under surface of glass, from A to B, may be blackened or built of opaque material, as shown in the drawing. Supposing the room to be twelve feet wide, the highest part of the roof, A, should be about ten, sloping down for about eight or ten feet from the sitter, or A, to the lowest part, C, which may be a flat roof, leaded or tiles, or other opaque material, and which need be no higher than convenient to walk under. The sloping part just over the head of the sitter, A, B, may be hinged as a flap, to be



lifted up when the weather will admit, as the warm air ascends to this the highest part. This makes an admirable ventilator, even in this country, in summer. The back, B, should be placed against a tall house if possible, while the rest should be placed so as to have no obstructions.

The interior of the room should be coloured a *pale* green colour, without pattern of any kind, as a pattern would distract the eye of the sitter.

The blinds on the top-lights, E, may be made to pull down from A to C; spring-blinds are best, if good. The side-lights, D, may be managed with curtains.

We will venture to say, that no one working in such a room as we have just described, and which is equally recommended as the best for efficiency here or abroad, would ever wish to alter it, after experiencing its comfort and rapidity as we have done. To such, however, as are in possession of a house such as we first described (as many are from unavoidable circumstances), it can be much improved by painting out all the light with the exception of the proportion shown in the last drawing.

A good plan to keep the collodion and chemicals cool, is to wrap a rag kept constantly wet round the stock bottles, and to keep them in the dark.

As water is not so conveniently laid on in the houses in India as here, it would be as well (as the water is generally brought in skins) to have a large earthen vessel or "chattie" placed on a firm bench higher than the head, and suspend a siphon with a tap and rag, to keep back the insects. This should be frequently cleaned out. The water will keep cooler in the earthen vessel than any other.

In out-door manipulation the operator will have many local difficulties to contend with; but if he keeps to the

formulas here advised, he will find very little, if any, more difficulty than in this country.

The light, although the visual rays are very intense, has not so much chemical power on the film as one would imagine. Our idea is, that it is owing to its chemical properties being immediately absorbed by surrounding objects.

APPENDIX.

In a former part of this work we said that bromo-iodized collodion was useless in the negative process, by this we mean, that it is useless where the bath is in a condition (See "Negative Bath") to give a sufficiently dense negative at one operation without intensifying. To prove this assertion, let our reader coat one-half of a glass with bromo-iodized collodion, and the other half with a *good* iodized negative collodion. It will be found that on developing, the half which was coated with iodized collodion will appear (if properly timed in the camera) sufficiently dense to print with the detail well out; while the side coated with the bromo-iodized collodion will appear only as a strong positive, and will require much intensifying to bring it up to the density of the other side, and then will print very hard in comparison. The contrary, however, is the result if we reverse the conditions. If, as before, we coat one-half of a glass with bromo-iodized, and the other half with iodized collodion-but sensitized in a neutral or acid bath (that is, such as is described in "Turning Positives into Negatives"), and giving both sides the same exposure in the camera, we

shall find that the side coated with bromo-iodized collodion will be fully out, but faint, and wanting intensifying, while the side coated with iodized collodion will appear under-exposed and foggy, and altogether unsatisfactory.

What we assert, and what we hope our readers will by this time agree with us in, is this: that, in order to get sufficient density to give a rich printing negative, an appreciable amount of exposure under ordinary circumstances is absolutely necessary, both with iodized collodion and bromo-iodized; this length of exposure we have over and over again proved by careful experiments, both in ordinary and instantaneous photography, to be the same, *provided* each collodion is worked with the bath best adapted to its requirements.

Take the case of a stereoscopic portrait, the two sides of which shall be printed from negatives, the one obtained by an iodized collodion and alkaline negative bath, and the other from a negative obtained with a bromo-iodized collodion and nitric acid bath. Give the glass prepared with iodized collodion five seconds exposure on a fine day, and the glass prepared with bromo-iodized collodion two and a half seconds, or just half the time of exposure of the other. On developing each with their respective developers, the picture taken with bromo-iodized collodion will *appear* as if it was equally well brought out as its opponent, which had double the exposure; but, unfortunately, it will be found too faint to print without intensifying, and then we shall find, by the time it is sufficiently dense to print, that it has no half tone, the high lights having absorbed nearly all the silver deposited, owing to the parts in shadow not having had sufficient exposure to appropriate their share. It will thus be found by this experiment, as well as many others which may suggest themselves to our readers, that a suffi-

cient amount of exposure must be given in both cases (and which amount will always be found to be equivalents of each other) to give a sufficient foundation for the subsequent depositions of silver, whether deposited at once, as in the alkaline bath and iodized collodion, or by the after-intensification required for the nitric acid bath and bromo-iodized collodion.

Could we take the faint picture just described as being taken with half the exposure of the other, and strengthen it by some method by which the film should thicken equally, we should then obtain an intelligible advantage in the diminished exposure necessary. We have tried various methods to accomplish this, and find nothing better or more simple than the old bichloride process, described in a former part of this work, occasionally substituting weak iodide of potassium for the weak hyposulphite of soda. In this case, the picture being silver, combines with two other equivalents, namely, chlorine and mercury, which makes the film three times the thickness it was previously; by washing this over with weak hyposulphite, the chlorine is substituted for sulphur, which is more non-actinic to light; while if we use weak iodide of some kind we substitute iodine for chlorine, which is still more non-actinic, and its combining equivalent is still higher than sulphur, as 126·36 is to 16·09.

Gold may be substituted for mercury with advantage, as being more stable; but for amateurs, this will be found rather an expensive substitute.

The great drawback to the above process, however, is that a certain thickness of deposit is necessary in the first place, to combine with either mercury or gold or any other metal, and it unfortunately happens that the most sensitive films are always the faintest, giving, when even in combination

with gold or mercury and iodine, barely sufficient density to print a faint flat positive on paper; while on the other hand, when we have a film or layer of silver forming the picture of sufficient thickness to print (when in combination with an iodide or sulphide) a good picture, we shall find that when we compare the length of exposure with that of a direct negative the difference is very trifling, if any, in favour of bromo-iodized collodion, while all the other advantages of manipulation are in favour of the iodized collodion and alkaline bath.

Should our remarks on this interesting and important subject find favour with our photographic friends, we are prepared on some future occasion to discuss the point still further, trusting that what we have advanced will induce some of our readers to give another trial to our old friend the direct negative process and the many decided advantages it possesses.